MATH 333: Probability & Statistics. **Examination # 2** **(Spring 2005)**

April 6, 2005 (A) **NJIT**

Name:	**SSN:**	**Section #**

Instructors **: A. Jain, H. Khan, K. Rappaport**

➔ **Must show all work to receive full credit.**

I pledge my honor that I have abided by the Honor System. ______________________________
(Signature)

Score

#1	
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1. Suppose that only 25% of all drivers come to a complete stop at an intersection with flashing red lights in all directions. What is the probability that of 20 randomly chosen drivers coming to the intersection under these conditions:

a) At most 6 drivers will come to a complete stop? (4 pts)
b) Exactly 6 drivers will come to a complete stop? (4 pts)
c) At least 6 drivers will come to a complete stop? (4 pts)
d) For the next 20 drivers, what is the expected number of drivers who would come to a complete stop? (4 pts)

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2. An appliance dealer sells three models of upright freezers having 13.5, 15.9, and 19.1 cubic feet of storage, respectively. Let X = the amount of storage space purchased by the next customer who buys a freezer. The probability mass function of X is given below:

X	13.5	15.9	19.1
P(x)	0.2	0.4	0.4

   a) Compute E(X), $E(X^2)$, and V(X). (6 pts)
   b) If the price of a freezer having capacity X cubic feet is 25X – 8.5, what is the expected price paid by the next customer to buy a freezer? (4 pts)
   c) What is the variance of the price paid by the next customer? (4 pts)
   d) Suppose that although the rated capacity of a freezer is X, the actual capacity is $h(X) = X - 0.01\,(X^2)$. What is the expected value of h(X)? (4 pts)

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3. Let X be the difference between the scheduled flight time and the actual flight time from Newark to Miami, which follows the probability density given by
   $f(x) = k(36 - x^2)$ for $-6 < x < 6$.

a. What is the value of k? (6 pts)
b. Determine F(3), where F(x) is the cumulative distribution function of X. (6 pts)
c. What is the expected value of X? (6 pts)

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4. The mileage of one brand of radical tires is an exponential random variable with mean of 40,000 miles. Find the probability that a randomly chosen tire will last:

a. At least 20,000 miles. (4 pts)

b. Between 20,000 and 30,000 miles. (4 pts)

c. Find the probability that the mileage of a randomly chosen tire exceeds the mean mileage by 2 standard deviations. (4 pts)

d. Find the value of the median mileage of these radial tires. (4 pts)

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5. Let X = the number of automobile accidents on the whole length of Interstate 95 in one day. Suppose X follows a Poisson distribution with the mean of 4 accidents.

(a) What is the probability density function of the time interval between two successive accidents? (5 pts)

(b) What is the probability that the time interval between two successive accidents is more than one day? (4 pts)

(c) Find the probability that the total number of accidents in 2 days is equal to 9. (4 pts)

(d) Find the probability that the total number of accidents in 5 days is equal to 22. (4 pts)

6. The diameter of a component follows a normal distribution with mean of 1 inch and standard deviation of 0.1 inches. A component is considered good if its diameter is between 0.65 and 1.15 inches, otherwise it is defective.

(a) What percentage of components will be defective? (5 pts)

(b) If the mean of the diameter distribution is changed to 0.9, what percentage of components will be defective? (5 pts)

(c) If the mean of the diameter distribution is changed to 0.9 and the standard deviation is doubled to 0.2 inches, what percentage of components will be defective? (5 pts)

END